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Kogane et al.

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[45] **Date of Patent: * Jul. 16, 1991**

[54] **SHEET PUNCHING CUTTER**

[75] Inventors: **Mikio Kogane; Mizuho Nishimura,** both of Ashigarakami; **Tsutomu Kimura,** Minato, all of Japan

[73] Assignee: **Fuji Photo Film Co., Ltd.,** Kanagawa, Japan

[*] Notice: The portion of the term of this patent subsequent to Jan. 9, 2007 has been disclaimed.

[21] Appl. No.: **237,198**

[22] Filed: **Aug. 29, 1988**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 85,600, Aug. 14, 1987, Pat. No. 4,892,019.

[30] **Foreign Application Priority Data**

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Aug. 28, 1986	[JP]	Japan	61-202551
Aug. 29, 1986	[JP]	Japan	61-203476
Aug. 29, 1986	[JP]	Japan	61-203477

[51] **Int. Cl.**[5] **B26D 7/18;** B26D 9/00

[52] **U.S. Cl.** **83/105;** 83/110; 83/123; 83/140; 83/150; 83/156; 83/658; 83/682

[58] **Field of Search** 83/102, 105, 110, 123, 83/125, 128, 139, 140, 150, 155, 618, 620, 658, 681, 682

[56] **References Cited**

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Primary Examiner—Hien H. Phan

Attorney, Agent, or Firm—Sughrue, Mion, Zinn Macpeak & Seas

[57] **ABSTRACT**

A cutter for punching a sheet of material having a fixed block disposed so as to face one side of the sheet, a punching blade disposed at the opposite side of the sheet relative to the fixed block, a cutting blade disposed spacedly and along the punching blade, and a transporting roller disposed inside the moving blade. A punched-out portion punched by the punching blade is thereby transported with and separated from a punched-remaining portion cut by the cutting blade.

18 Claims, 10 Drawing Sheets

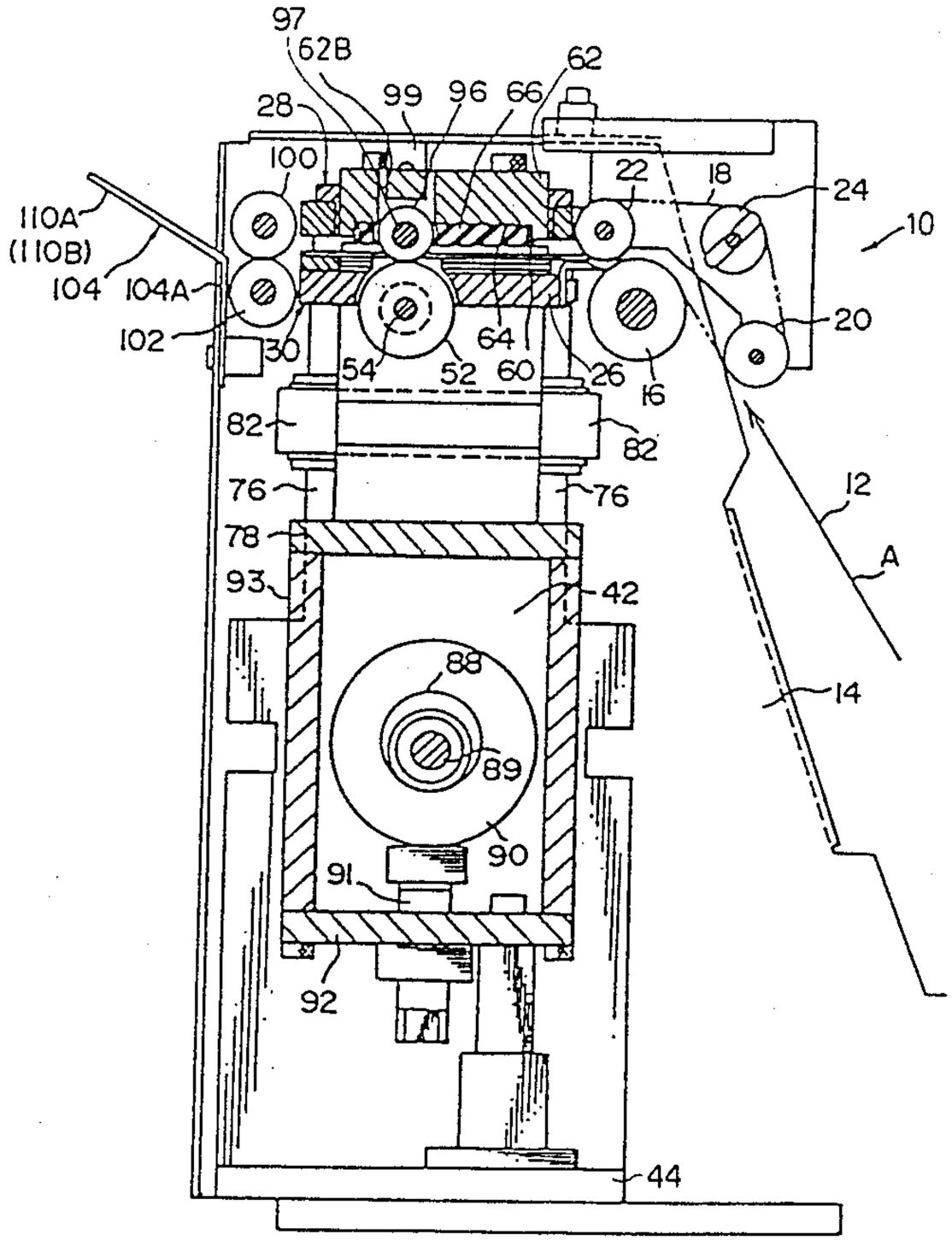


FIG. 1

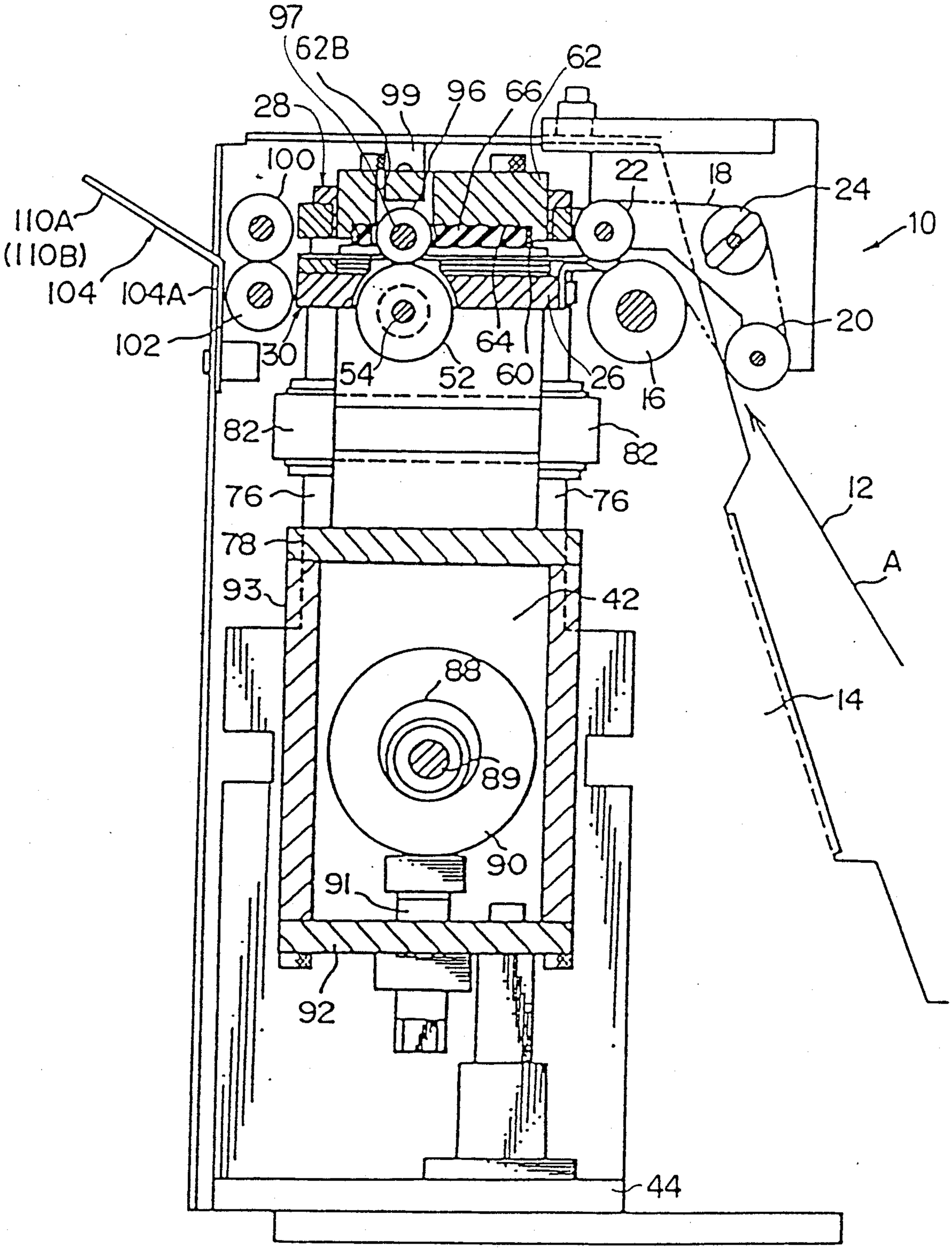
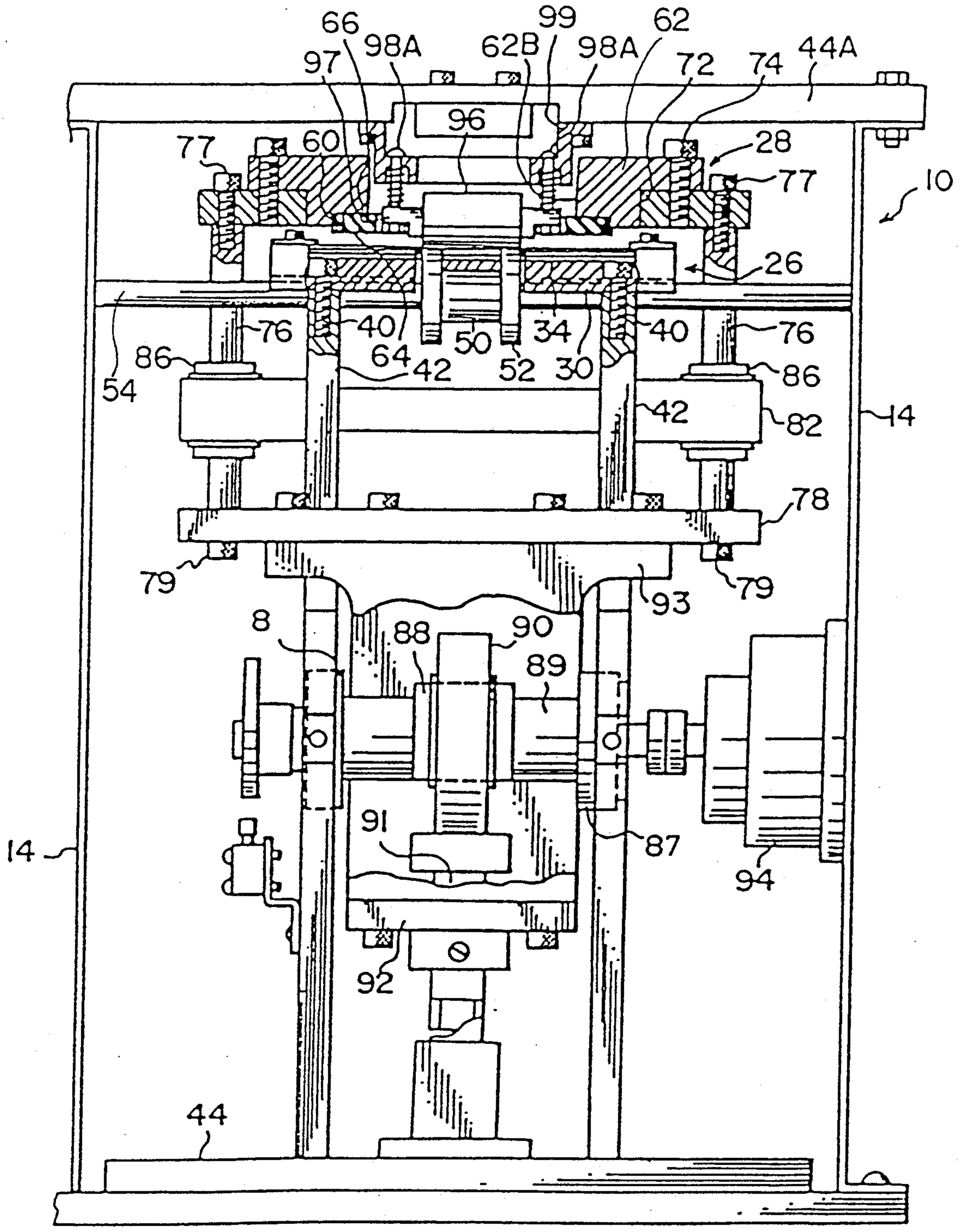

97
62B
62
28
99
96
66
100
22
18
24
10
110A
(110B)
104
104A
102
30
54
52
60
64
26
16
20
82
82
76
76
78
93
42
88
89
90
91
92
12
A
14
44

FIG. 2


66
99
62
97
98A
62B
98A
72
74
44A
96
77
60
28
77
10
26
76
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34
40
76
86
64
42
52
30
86
54
42
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79
93
8
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91
87
94
92
14
44

FIG. 3

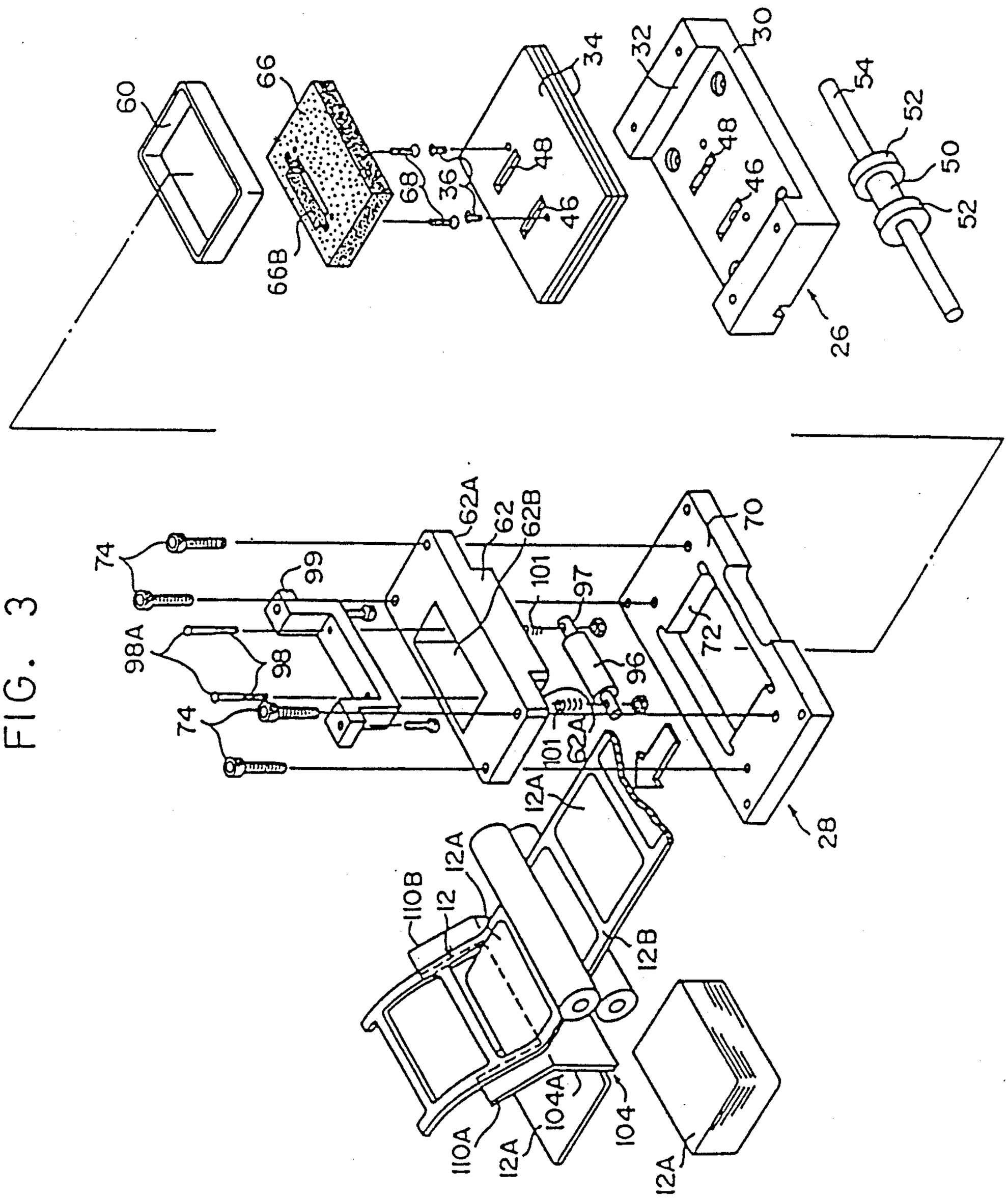
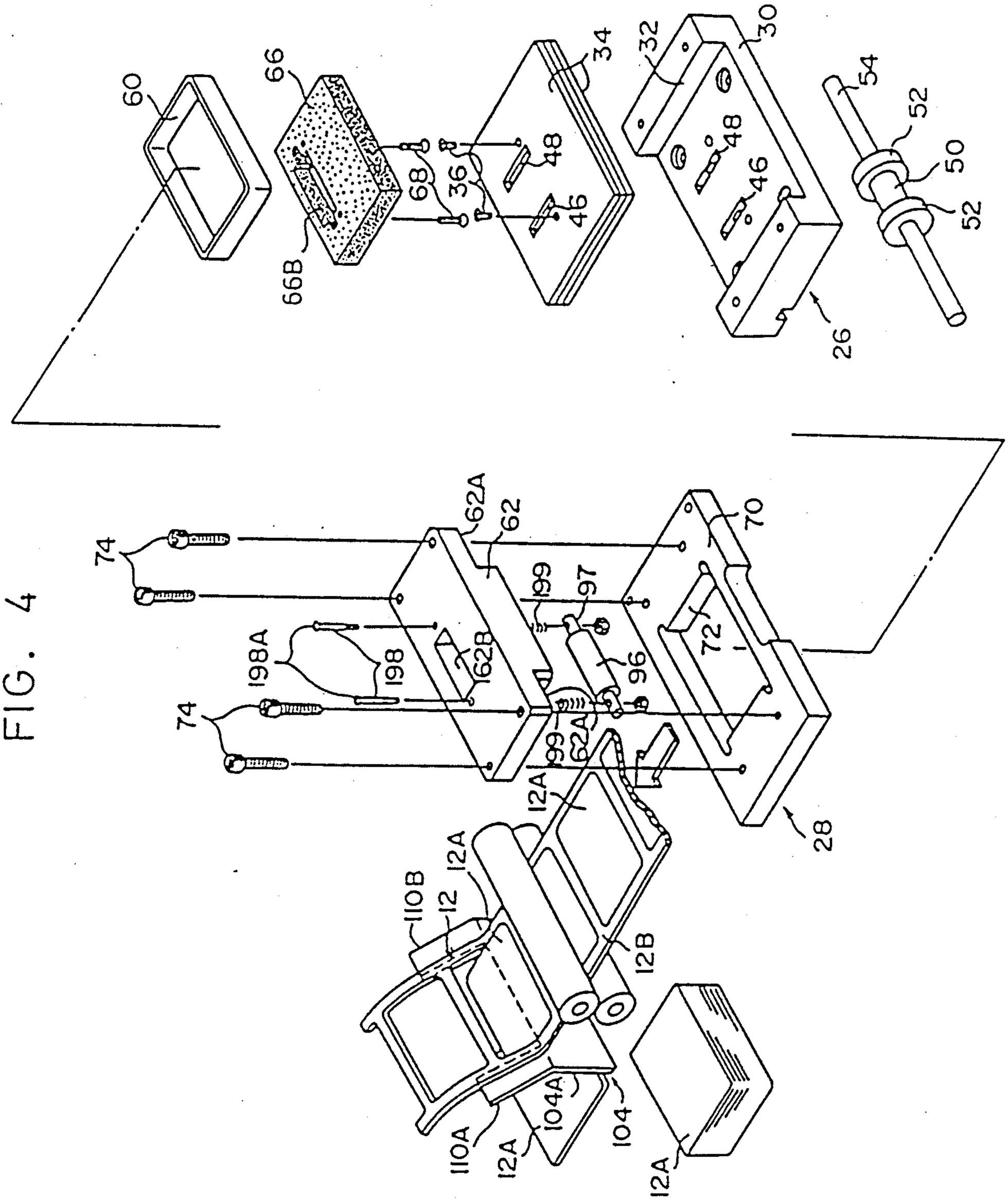

60
66
66B
68
36
34
48
46
32
30
54
52
50
52
26
74
99
98A
98
74
62A
62
62B
101
97
96
72
70
28
12A
110B
12
12B
110A
104A
104

FIG. 4


60
66
66B
68
36
34
48
46
32
30
54
52
50
52
26
74
62A
62
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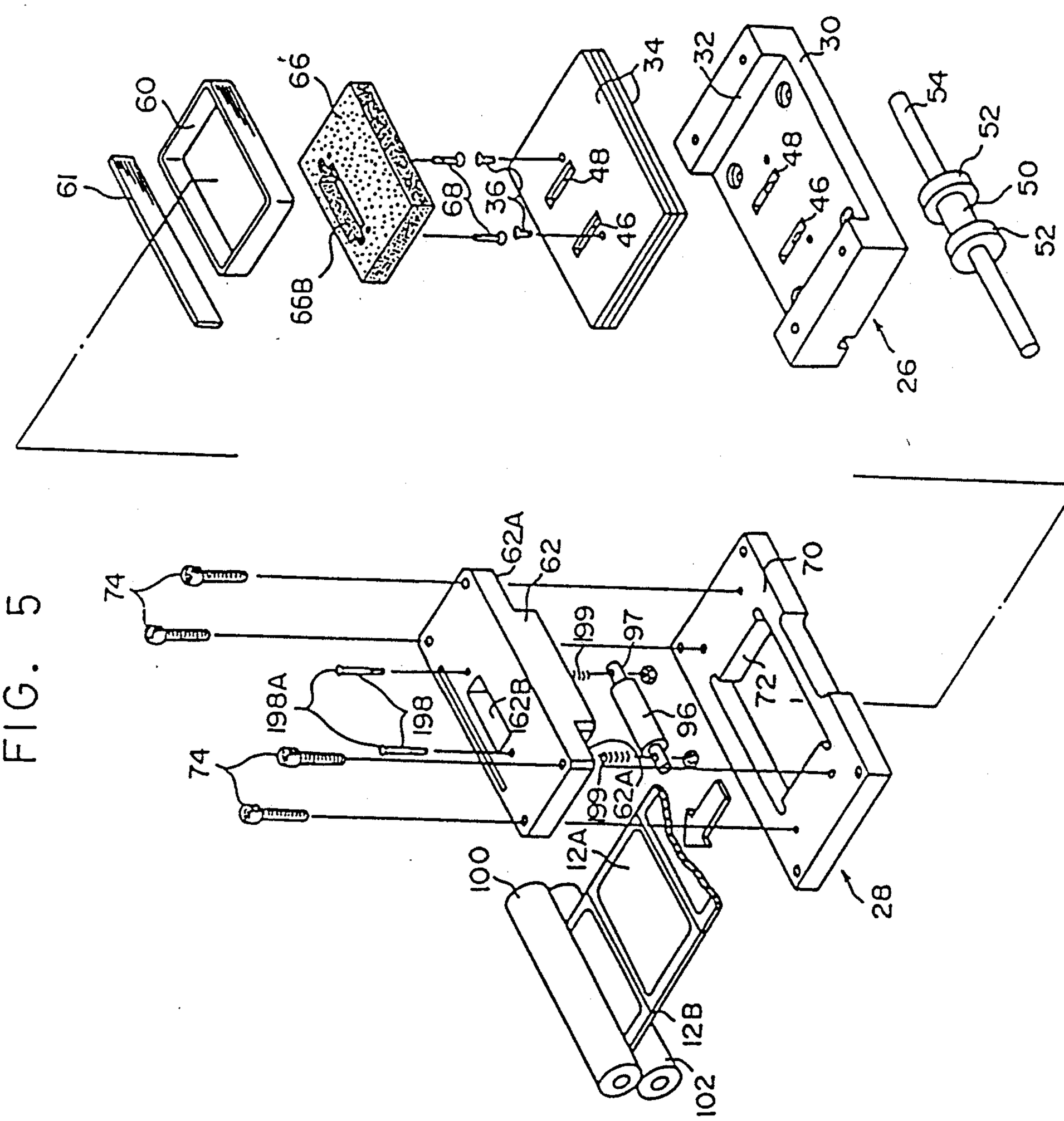
198A
198
62B
74
99
97
72
96
62A
99
12A
28
110B
12
12A
12B
110A
12A
104A
104
12A

FIG. 5


61
60
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68
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26
74
62A
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62B
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72
96
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12A
100
128
02
28

FIG. 6

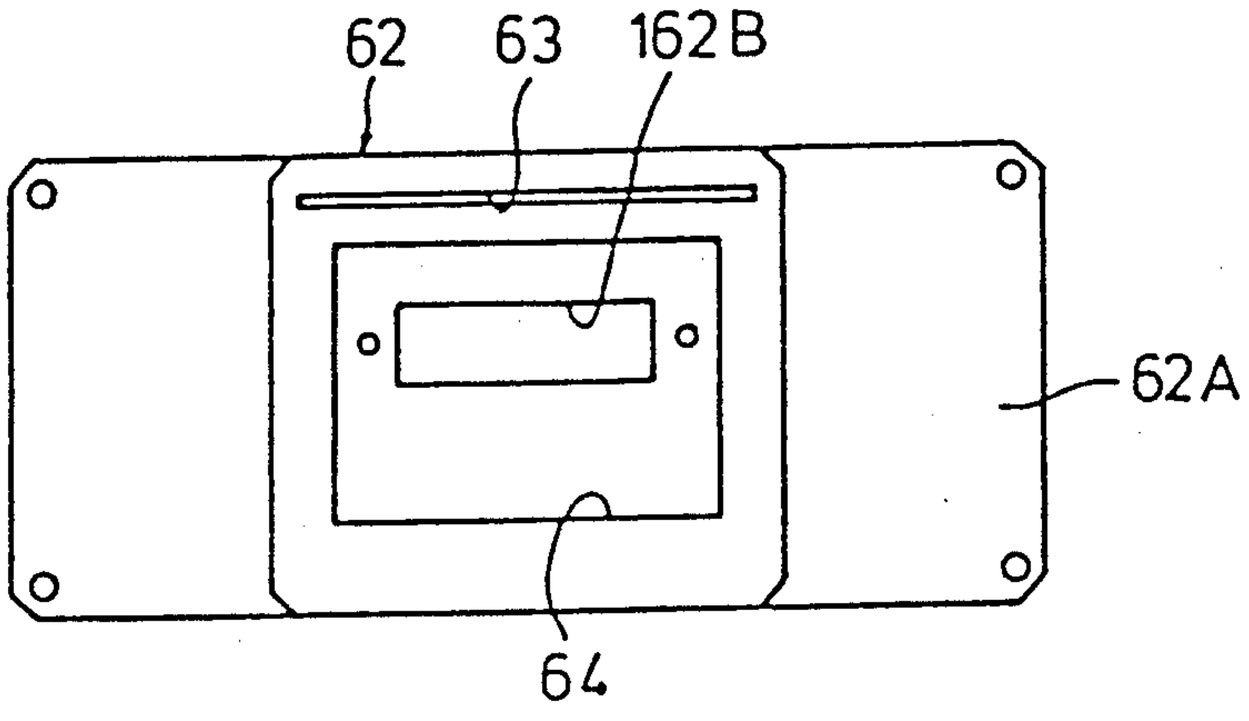


FIG. 8

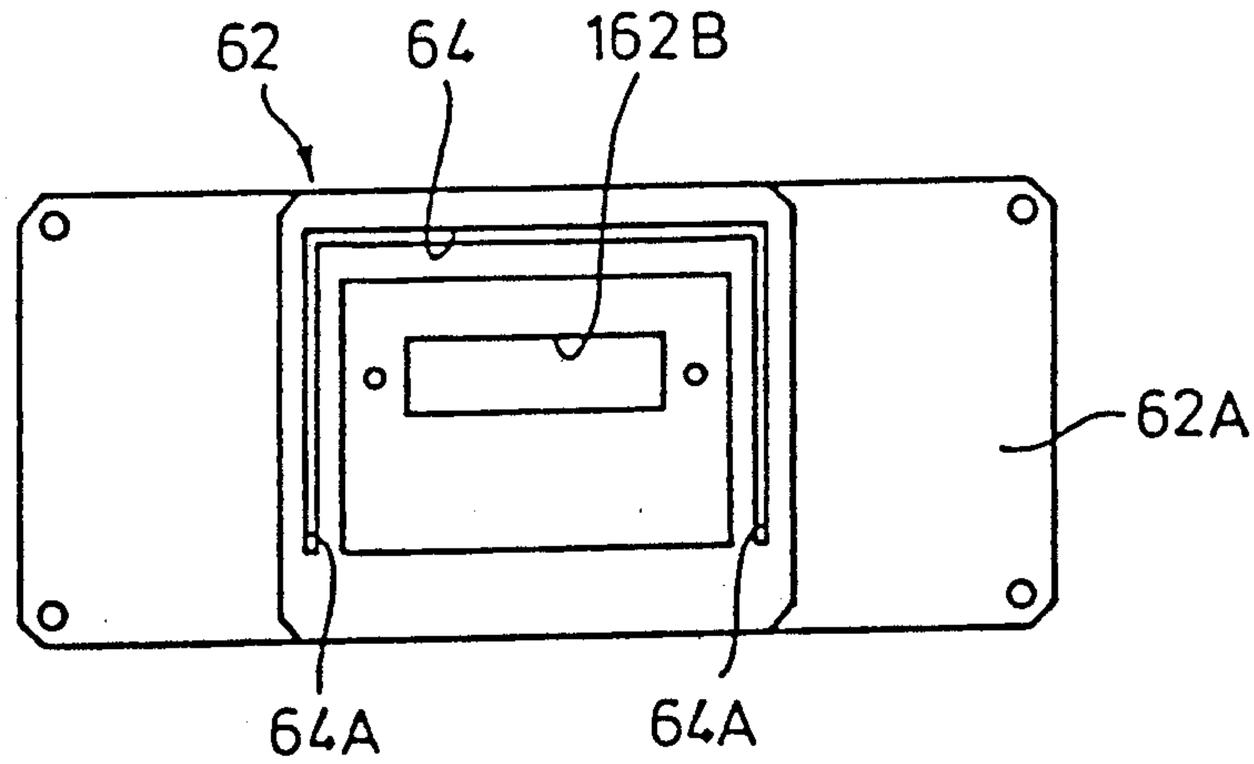
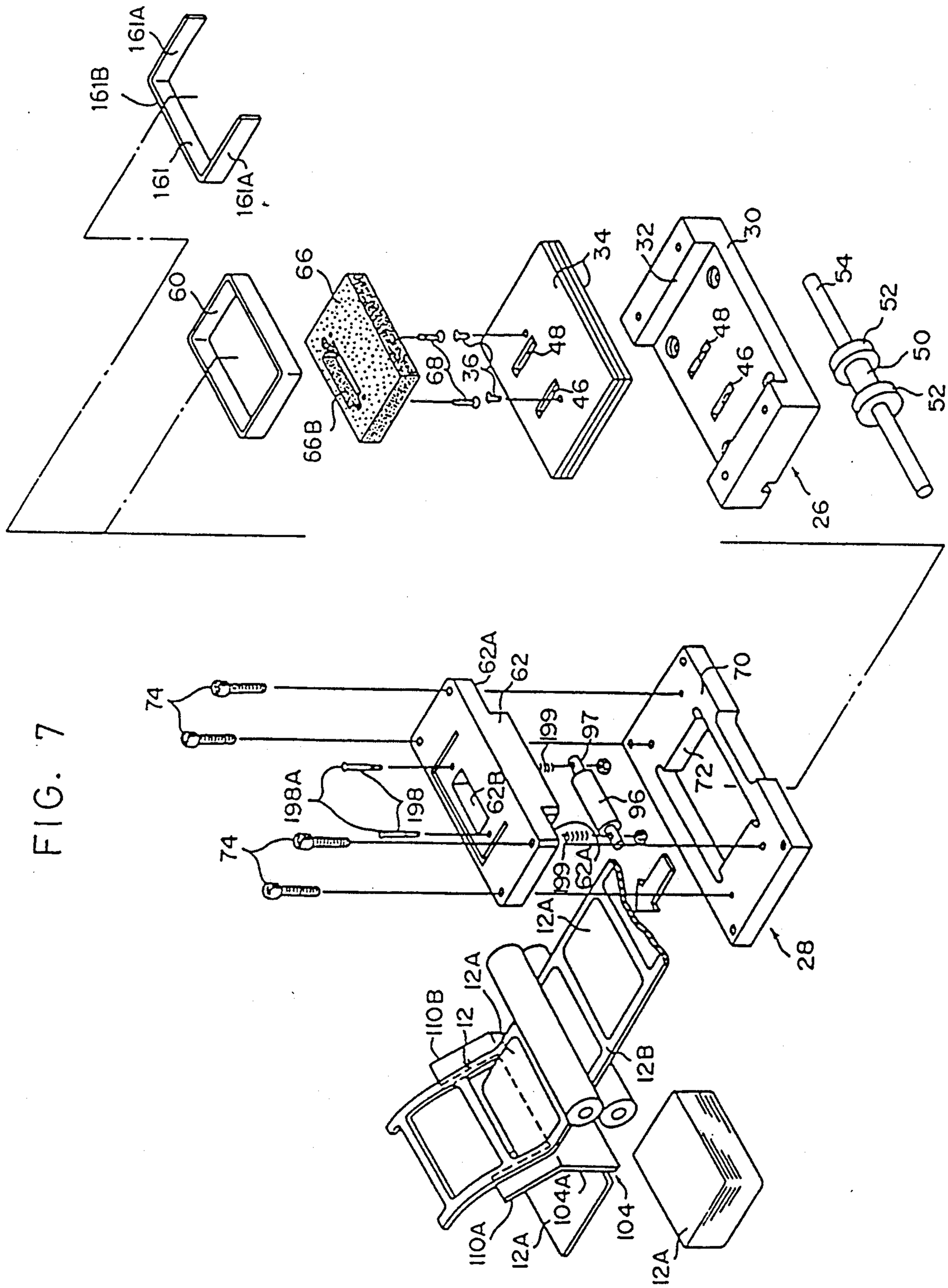


FIG. 7


161A
161B
161
161A
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66
66B
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34
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30
54
52
50
52
48
46
26
74
62A
62
70
198A
198
62B
74
199
97
96
72
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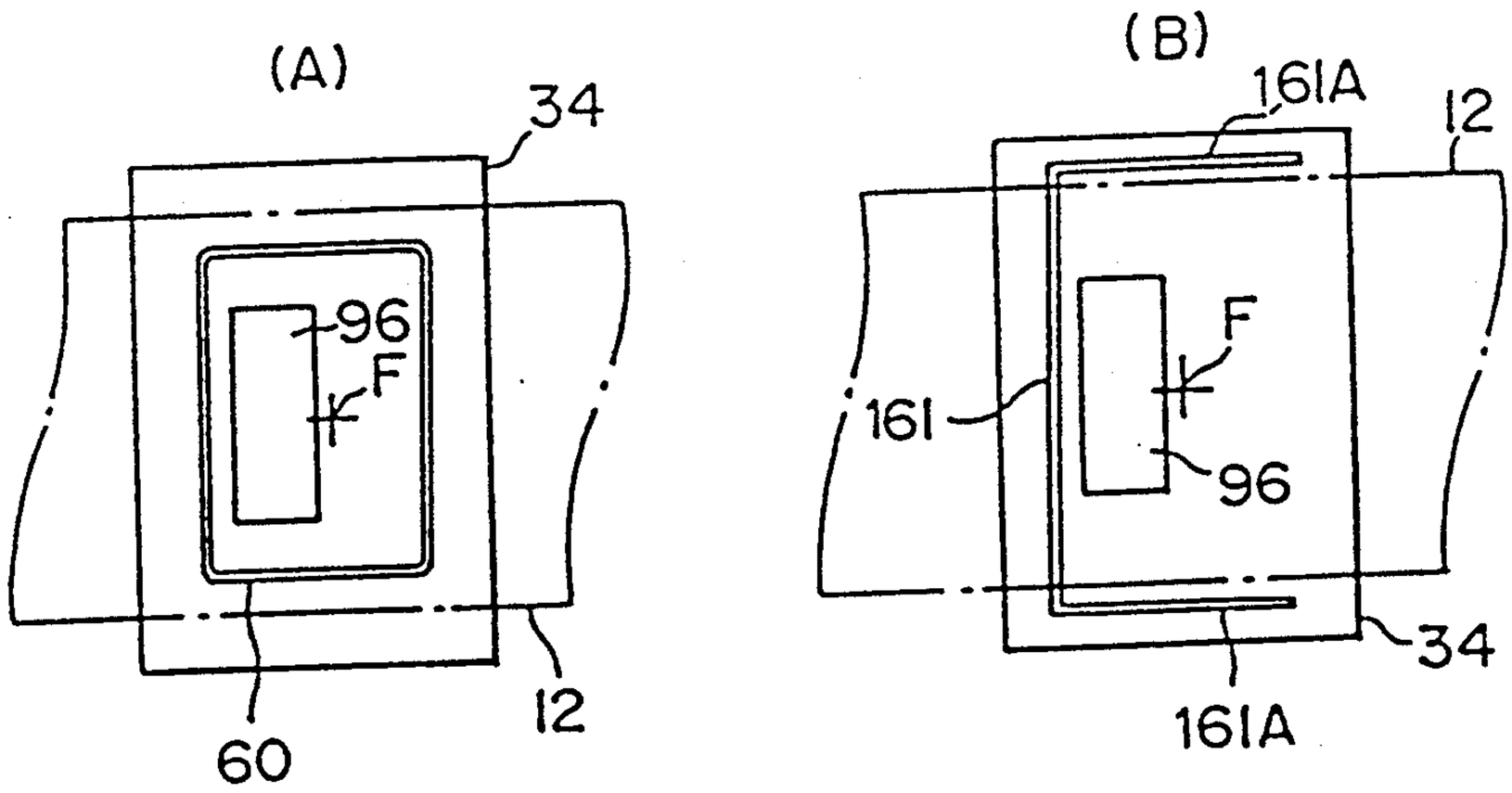
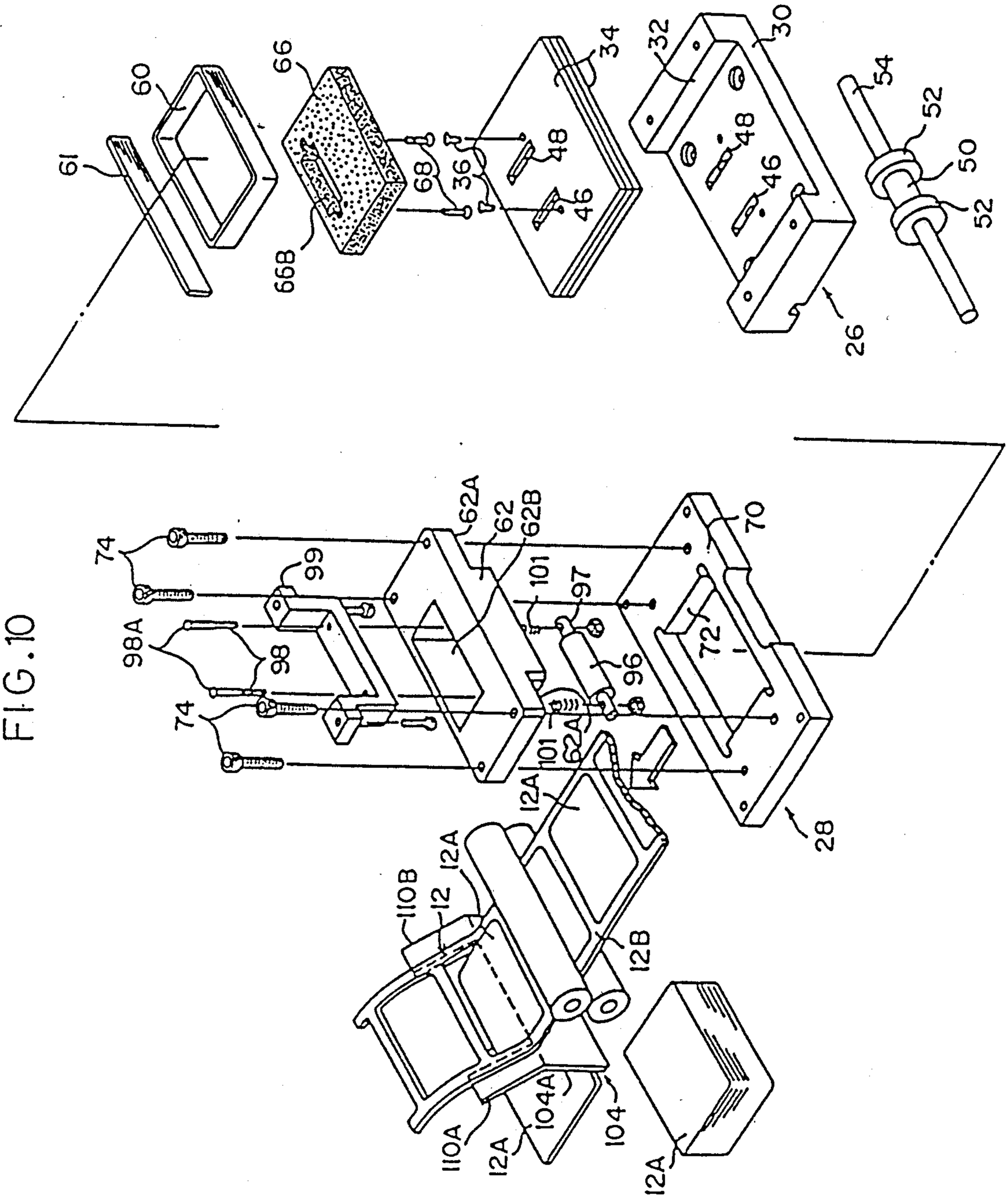
62A
12A
28
12A
110B
12
12B
110A
12A
104A
104
12A

FIG. 9

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52
26
62A
62
62B
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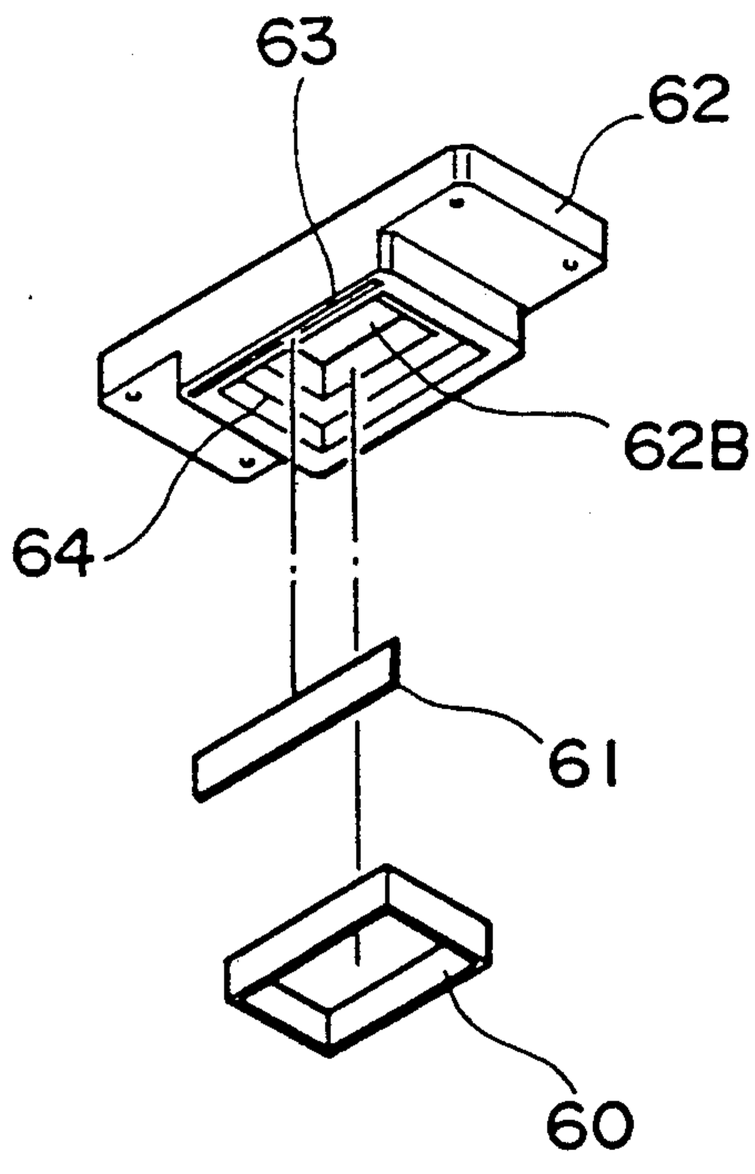
99
98A
98
74
101
97
72
96
62A
101
12A
28
110B
12
12A
12B
110A
12A
104A
104
12A

FIG. 10

FIG. 11



SHEET PUNCHING CUTTER

BACKGROUND OF THE INVENTION

Continuity

This is a continuation-in-part application of U.S. patent application Ser. No. 07/085,600 filed Aug. 14, 1987 now U.S. Pat. No. 4,892,019.

FIELD OF THE INVENTION

This invention relates to a sheet punching cutter for punching a sheet of photosensitive material or the like into a piece of a desired shape.

In the process of making a negative print of photographic images, a part of a roll of unused photographic paper is drawn out, images on a negative film or a CRT is printed on the photographic paper, and a sheet of negative print obtained by development is cut and separated at the side of every picture by using a cutting blade having a linear blade portion.

In some cases, portions of picture areas in the negative print are punched into pieces of a desired size as products. This process is mainly applied to the production of driver's licenses or ID cards.

In that case, it is necessary for the operation of punching desired picture portions out of a lengthwise negative print sheet to use a type of cutter which has a male die corresponding to the punching shape and a female die for receiving this male die. This type of cutter is large and expensive and needs to be adjusted in accordance with the dimensions of the male and female dies at the time of assembly.

SUMMARY OF THE INVENTION

The present invention has been achieved in consideration of the above-described facts and an object of the present invention is to provide a sheet punching cutter which eliminates the need for the manufacture of a female die and adjustment of dimensions when used to produce, by punching, a pieces of a desired size from a sheet of material.

To this end, the present invention provides in one of its aspects a sheet punching cutter having: a fixed block disposed so as to face one surface of a sheet of material; a moving punching blade brought close to and moved away from the fixed block so as to punch a desired portion of the sheet; and a transporting roller disposed inside the moving punching blade and adapted for transporting a punched-out portion of the sheet punched by the moving punching blade.

In the construction in accordance with the present invention, the moving blade is moved close to or away from the fixed block. This differs from the conventional arrangement in which a desired portion of the sheet is punched by engaging male and female dies with each other. The construction in accordance with the present invention is simple since the the present invention simply has been designed to simply move the moving blade close to or away from the fixed block, thereby eliminating the need for adjustment of the dimensions of the male and female dies. Moreover, it is possible to transport a punched-out portion along with a punched-remainder portion by disposing the transporting roller inside the moving blade.

The present invention provides in another of its aspects a sheet punching cutter further having a separating means for guiding the punched-out portion and the punched-remainder portion of the sheet in different directions.

The present invention provides in still another of its aspects a sheet punching cutter further having a transporting means for moving the sheet to the punching position at which the sheet is punched, and moving the sheet away from the punching position, wherein the speed at which the sheet is transported by the transporting roller and the speed at which the sheet is transported by the transporting means are different from each other.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a longitudinal sectional view of a sheet punching cutter which represents a first embodiment of the present invention;

FIG. **2** is a cross-sectional view of the sheet punching cutter shown in FIG. **1**;

FIG. **3** is an exploded perspective view of a fixed block, a moving block and other related parts of the first embodiment;

FIG. **4** is an exploded perspective view of a second embodiment of the present invention corresponding to FIG. **3** of the first embodiment;

FIG. **5** is an exploded perspective view of a third embodiment of the present invention corresponding to FIG. **3** of the first embodiment;

FIG. **6** is a bottom view of a cutting plate used in the third embodiment;

FIG. **7** is an exploded perspective view of a fourth embodiment of the present invention corresponding to FIG. **3** of the first embodiment;

FIG. **8** is a bottom view of a cutting plate used in the fourth embodiment;

FIGS. **9**A and B are plan views of the relationship between a moving punching blade and a moving cutting blade of a fourth embodiment;

FIG. **10** is an exploded perspective view of a fifth embodiment of the present invention; and

FIG. **11** is an exploded perspective view showing an assembling of a cut plate, a punching blade and a cutting blade.

DESCRIPTION OF PREFERRED EMBODIMENTS

FIGS. **1** and **2** illustrate a punching cutter **1** which represents a first embodiment of the present invention. The punching cutter **10** allows a sheet of photographic paper **12** which has undergone printing and development of an image in the preceding step (not shown) to be transported between a pair of side plates **14** in the direction indicated by the arrow A.

A winding roller **16** is disposed between the pair of side plates **14** so that the photographic paper **12** is transported in the horizontal direction after being tightly pressed against the winding roller **16** by a pressing belt **18** which is endless and is wound around winding rollers **20**, **22** and **24**. The winding roller **20** rotates by receiving a driving force of a motor (not shown).

The photographic paper **12** which is being fed out between the winding roller **16** and the pressing belt **18** enters the gap between a fixed block **26** and a moving block **28**.

As shown in FIG. **3**, the fixed block **26** is provided with a base plate **30** which has a cut recess **32** in which a plurality of brass seat plates **34** are accommodated, and the block **26** is adapted to allow the photographic paper **12** to pass over the seat plates **34**.

The seat plates **34** are fixed to the base plate **30** by small screws **36** so that the photographic paper **12** is placed on the upper most seat plate **34**.

The widthwise opposite ends of the base plate **30** are fixed, as shown in FIG. **2**, to the upper ends of vertical brackets **42** by attachment bolts **40**, and the vertical brackets **42** are fixed to a machine base **44**.

Rectangular holes **46** and **48** are formed through the base plate **30** and the seat plates **34** on opposite sides of the center line in the direction of transportation of the photographic paper **12**, so that large-diameter portions **52** of a lower roller **50** projects through these rectangular holes. That is, the large-diameter portions **52** of the lower roller **50** pass through the rectangular holes **46** and **48** of the seat plates **34** and contact the lower surface of the photographic paper **12** when the paper is transported. A support shaft **54** which is inserted into and fixed to the lower roller **50** such as to be coaxial with this roller passes through the brackets **42** and the opposite ends of the shaft **54** are axially supported by the side plates **14**.

The shaft **54** is rotated by a driving force of a driving means (not shown).

An annular or endless moving punching blade **60** is mounted on a cutting plate **62** disposed on the moving block **28**. The moving blade **60** is formed by bending a thin plate member in such a manner that the longitudinal axis of the thin plate member forms a rectangle. The upper end of the moving blade **60** is accommodated in a recess **64** which is formed in a lower surface of the cutting plate **62**, and the lower end projects downwardly from the cutting plate **62**. A resilient block **66** is disposed in the moving blades **60** and fixed to the cutting plate **62** by small screws **68**. This resilient block **66** is formed from a resilient material such as polyvinyl chloride or a spongelike material and acts to force a punched-out portion **12A** of the photographic paper **12** from the moving blade **60**.

The cut plate **62** has a rectangular hole **62B** which is formed generally at the center of the cutting plate **62** and which accommodates an upper roller **96**. A support shaft **97** which passes through the upper roller **96** and is coaxial with this roller is fixed by screw means to the lower ends of guide shafts **98** which pass through a fixed plate **99** which is fixed to the machine base **44** by a top plate **44A** and the side plates **14**. The upper ends of the guide shafts **98** project toward the upper end of the fixed plate **99**, and the downward movements of the guide shafts **98** are limited by their large-diameter portions **98A**. Compression coil springs **101** are fitted around the guide shafts **98** and are interposed between the support shaft **97** and the fixed plate **99**, so that the upper roller **96** is pressed against the lower roller **50** by the urging force of the compression coil springs **101**, thereby providing a force of transporting the punched-out portion **12A** after punching. As is understood from FIGS. **1** and **2**, the size of the rectangular hole **62B** is determined so that it can accommodates the fixed plate **99**.

Even when punching is inadequate, the separation of the punched-out portion **12A** form the photographic paper **12** can be facilitated by slightly increasing or reducing the transportation speed of the upper roller **96** and the lower roller **50** relative to that of the other members, namely, the winding roller **16**, an upper transporting roller **100**, a lower transporting roller **102**, and so forth.

A rectangular hole **66B** through which the upper roller **96** passes is formed in the resilient block **66** which is disposed in the moving blade **60**.

The cutting plate **62** is inserted into a rectangular hole **72** which is formed at the center of a pressing plate **70**, and thin flanges **62A** which project from the widthwise opposite ends of the cutting plate are fixed to the pressing plate **70** by attachment bolts **74**.

As shown in FIG. **2**, the upper ends of con'rods **76** are connected to the pressing plate **70** by bolts **77** at the opposite sides of the rectangular hole **72**, the lower ends of the con'rods **76** are fixed to the upper end of a coupling plate **78** by bolts **79**.

An intermediate portion of each con'rod **76** is axially supported by a bearing **86** on a supporting plate **82**, and the supporting plate **82** is fixed to the vertical brackets **42**. The cutting plate **62** is linearly moved in the vertical direction by the coupling plate **78** through the medium of the pressing plate **70** while being guided by the supporting plate **82**.

A shaft **89** of an eccentric cam **88** is axially supported by bearings **87** between the vertical brackets **42**. The outer surface of the eccentric cam **88** is fitted to a bearing **90** while aligning the axes thereof. The head of a bolt **91** faces the lower end of the bearing **90**. The bolt **91** is screwed into a lifting plate **92**, and opposite ends of the lifting plate **92** are connected to the coupling plate **78** by lifting side walls **93**. The shaft **89** is connected to the output shaft of a motor **94**. When the motor **94** rotates the eccentric cam **88**, the eccentric cam moves the lifting plate **92** and the lifting walls **93** in the vertical direction, and the con'rod lifts the moving block **28** up and down so that the moving block **28** is brought close to and moved away from the fixed block **26**.

When the moving block **28** is moved to the lowermost position, the lower end of the moving blade **60** contacts the seat plate **34** on the fixed block **26**, and a rectangular punched-out portion **12A** of the photographic paper **12A** passing through the gap between the moving block **28** and the fixed block **26** is thereby formed and cut out to be separated from a punched-remaining portion **12B**.

After punching, the photographic paper **12** which has passed through the gap between the fixed block **26** and the moving block **28** passes through the gap between the upper transporting roller **100** and the lower transporting roller **102**. The diving force of a motor (not shown) acts on one of the upper and lower transporting rollers **100** and **102**, thereby transporting the photographic paper **12**.

A separation guide **104** which constitutes a separating means such as that shown in FIG. **3** in detail is disposed so as to face an outlet portion at the upper and lower transporting roller **100** and **102**. One side **104A** of the guide **104** is fixed to the machine base **44**, and arms **110A** and **110B** extending from this side projects upward such as to correspond to the opposite sides of the punched-remaining portion **12B**.

In the separation guide thus formed, the punched-out portion **12A** is allowed to pass through the area between the arms **110A** and **110B**, as shown in FIG. **3**, and is thereafter stored.

The operation of the first embodiment will now be described below.

An image is printed in the preceding process (not shown), and a developed photographic paper **12** is supplied to the gap between the fixed block **26** and the

moving block **28** after passing through the gap between the winding roller **16** and the pressing belt **18**.

Then, when the motor **94** rotates, the con'rods **76** operate to downwardly move the moving block **28** by the rotation of the eccentric cam **88**, thereby pressing the moving blade **60** against the seat plate **34**. The photographic paper **12** is thereby separated into a punched-out portion **12A** and a punched-remaining portion **12B**.

After punching, the moving block **28** is lifted, and a tensile force caused by the upper and lower transporting rollers **100** and **102** acts on the punched-remaining portion **12B** so that this portion is transported toward the separation guide **104**. On the other hand, the punched-out portion **12A** is supplied with a driving force from the lower roller **50** and the upper roller **96** and is transported together with the punched-remaining portion **12B** through it has been separated therefrom.

When the photographic paper reaches the separation guide **104**, the punched-remaining portion **12B** is guided by the separation guide **104** and is moved upward. On the other hand, the punched-out portion **12A** moves straight in the same direction and is stacked. Thus, the punched-out portion **12A** and the punched-remaining portion **12B** are separated suitably, the punched-out portion **12A** is utilized as a product, and the punched-remaining portion **12B** is wound around a roller or the like (not shown) and is thereafter discharged as waste.

Even if the punched-out portion **12A** has not been adequately punched out of the punched-remaining portion **12B** and if the punched-out portion **12A** is partly connected to the punched-remaining portion **12B**, it is possible to completely separate the punched-out portion **12A** from the punched-remaining portion **12B**.

A second embodiment of the present invention will be described below with reference to FIG. **4**.

In this embodiment, the same components and members as those in the first embodiment are indicated by the same reference numerals, and the description for them will not be repeated.

This embodiment differs from the first embodiment in that the upper roller **96** is not supported on the moving block **28**, the fixed plate is not provided, and the upper roller **96** is supported by the cutting plate **62**. The support shaft **97** of the upper roller **96** is fitted through threaded portions to the lower ends of guide shafts **198** which pass through the cutting plate **62**. The large-diameter portions **198A** which are formed at the upper ends of the guide shafts **198** and which project toward the upper surface of the cutting plate **62** function to limit the extent of downward movements of the guide shafts **198**. Compression coil springs **199** are fitted around the shafts **198** and are interposed between the support shaft **97** and the cutting plate **62**. The upper roller **96** is pressed against the lower roller by the urging force of the compression coil springs **199**, thereby causing a force of transporting a punched-out portion **12A** after punching. In this embodiment, as is understood from the drawings, the size of a rectangular hole **162B** which is formed generally at the center of the cutting plate **62** is smaller than the rectangular hole **62B** in the first embodiment. This is because it is sufficient for the rectangular hole **162B** in this embodiment to have a size large enough to accommodate the upper roller **97**.

Other constructions and functions in accordance with the second embodiment are the same as those in the first embodiment and, therefore, the description for them will not repeated.

A third embodiment of the present invention will be described below with reference to FIGS. **5** and **6**. In this embodiment, the same components and members as those in the second embodiment are indicated by the same reference numerals, and the description for them will not be repeated.

This embodiment differs from the first embodiment in that a moving cutting blade **61** is provided along with the moving cutting blade **60**. The moving cutting blade **61** is in the form of a straight plate, and its one side in the widthwise direction is accommodated in a slit **63** which is formed in a lower surface of the cutting plate **62**, and the other side projects toward the seat plate **34**. The extent of projection of the moving cutting blade **61** is substantially the same as that of the moving punching blade **60**. The moving cutting blade is adapted to cut a punched-remaining portion **12B** perpendicularly to the longitudinal direction thereof.

Other constructions are the same as those in the second embodiment and the description for them will not be repeated.

The operation of this embodiment will now be described below.

An image is printed in the preceding process (not shown), and a developed photographic paper **12** is supplied to the gap between the fixed block **26** and the moving block **28** after passing through the gap between the winding roller **16** and the pressing belt **18**.

Then, when the motor **94** rotates, the con'rods **76** operate to downwardly move the moving block **28** by the rotation of the eccentric cam **88**, thereby pressing the moving punching blade **60** and the moving cutting blade **61** against the seat plate **34**. The photographic paper **12** is thereby separated into a punched-out portion **12A** and a punched-remaining portion **12B**, and at the same time, the punched-remainder portion is cut at a position between adjacent pictures.

After punching, the moving block **28** is lifted, a driving force caused by the upper and lower transporting rollers **100** and **102** and the lower and upper rollers **50** and **96** acts on the punched-out portion **12A** and the punched-remainder portion **12B** so that these portions **12A** and **12B** are transported to the next process though they have been separated from each other.

Specifically, it is possible to discharge the punched-remainder portion **12B** as waste by being simply accommodated in a box or the like without being wound and removed by using a particular means, since the punched-remainder portion **12B** has been cut at the side of every picture.

A fourth embodiment of the present invention will be described below with reference to FIGS. **7** and **8**. In this embodiment, the same components and members as those in the second embodiment are indicated by the same reference numerals, and the description for them will not be repeated.

This embodiment is arranged such that a moving punching blade **60** or a moving cutting blade **161** are selectively attached to the cutting plate **62** on the moving block **28**. The moving punching blade **60** is formed by bending a thin plate so that the longitudinal axis forms a rectangle in the same manner as that of the above-described embodiments. The upper end of the punching blade is accommodated in a recess **64** formed in a lower surface of the cutting plate **62**, and the lower end projects downwardly from the cutting plate **62**. The moving cutting blade **161** is designed to be attached after the moving punching blade **60** has been removed

from the recess **64** of the cutting plate **62**. The cutting blade **161** has a generally U-shaped form and is constituted by a linear cutting portion **161B** used to cut photographic paper and extensions **161A** which extend from the opposite ends of the cutting portion **161B** in the direction generally perpendicular to the cutting portion **161B**. As shown in FIG. **8**, grooves **64A** are formed in a lower surface of the cutting plate **62** on which the moving cutting blade **161** is supported so that the moving cutting blade **161** can be attached to the cutting plate. When the moving cutting blade **161** is attached to the cutting plate **62**, the extensions **161A** are positioned outside the photographic paper which is being transported, so as to extend in the longitudinal direction of the photographic paper. Therefore, the extensions **161A** do not face the photographic paper **12** and do not have any function of cutting the photographic paper **12**. The pressing plate **70** and the cutting plate **62** are mounted in such a manner that their axes are aligned with the center axis of the moving cutting blade **60**. In other words, the center of the moving punching blade **60** corresponds to the center of pressing force (at the point F in FIG. **9**(A)) so that the moving punching blade **60** is uniformly pressed against the seat plate **34** when the moving block **28** is moved down. When the moving cutting blade **161** is attached to the cutting plate, the center of the moving cutting blade **60** also corresponds to the center of pressing force (at the point F in FIG. **9** (B)) since the moving cutting blade has the extensions **161A**.

Other constructions are the same as those in the second embodiment and the description for them will not be repeated.

The operation of this embodiment will now be described below.

When the photographic paper is punched by using the moving cutting blade **60**, the operation is the same as that of the second embodiment. Therefore, the operation in accordance with the fourth embodiment will be described below with respect to only the case where the photographic paper is cut by the moving cutting blade **161**. The moving cutting blade **161** is first inserted into the cutting plate **62** instead of the moving punching blade **60**. The moving block **28** is moved down relative to the fixed block **26** in the same manner as that in the case of the moving punching blade **60**, thereby cutting the photographic paper **12**. Since, as shown in FIG. **9B**, the center of the pressing force of the moving cutting blade **161** corresponds to that of the moving punching blade by the effect of the extensions **161A**, it is possible to uniformly press the moving cutting blade **161** against the seat plate **34** even when the cutting portion of the moving cutting blade **161** deviates from the point F. Moreover, the magnitude of friction between the cutting blade and a portion of the seat plate **34** which is in contact with the cutting blade is small. In this case also, the upper roller **96** and the large-diameter portions function to apply a transporting force to the photographic paper **12** in the same manner as that in the other embodiments. Even if the upper roller **96** and the large-diameter portions are removed, the cutting operation can be effected by altering the arrangement of the transporting rollers. However, the cutting operation can be effected more easily and speedily by simply replacing the moving punching blade **60** with the moving cutting blade **161** without removing the upper roller **96** and the large-diameter portions **52**.

A fifth embodiment of the present invention will be described below with respect to FIGS. **10** and **11**.

In the fifth embodiment, a sheet punching cutter is comprised by a fixed block apparatus **26**, a moving block apparatus **28**, a photographic paper cutting apparatus which includes a punching blade **60** and a cutting blade **61**, a cut photographic paper transporting apparatus which includes a lower roller **50**, an upper roller **96** and transporting rollers **100**, **102**, and a separating and guide apparatus **104** in a similar manner described in the former embodiments.

The fixed block **26** includes a base plate **30** and a seat plate **34**. The base plate **30** is secured to a vertical bracket **42** which is fixed to a machine base **44** in the same manner explained in the third embodiment in FIG. **5**. The seat plate **34** which comprises a plurality of brass plates is fixed to the base plate **30** by screws **36** so that the photographic paper **12** is placed on the upper most seat plate **34**. Large diameter portions of the lower roller **50** extend through rectangular holes **46**, **48** provided to both the base plate **30** and seat plate **34** as shown in the drawings.

The moving block apparatus **28** comprises a cutting plate **62** and a pressing plate **70** which are secured by screws **74** to each other, and is connected to a lifting plate **92** by connecting rods **76** and connecting members.

An upper roller **96** is resiliently mounted to a fixed plate **99** through spring members **101** with guide shafts **98**, and the fixed plate **99** which is secured to the machine base **44** is disposed in a rectangular through hole **62B** provided to the cutting plate **62** in the same manner explained in the first embodiment in FIG. **3**.

As shown in FIG. **11**, the cutting plate **62** has the rectangular through hole **62B**, a larger rectangular recess **64** surrounding the through hole **62B** and a slit **63** which is spacedly and longitudinally provided at an outer portion of the recess **64**.

The punching blade **60** of the photographic paper cutting apparatus is formed by rectangular bending a thin plate member, and is secured to an inner peripheral portion of the larger rectangular recess **64** of the cutting plate **62** so as to project lower edge portions from a lower surface of the cutting plate **62**, and the cutting blade **61** is made from a straight plate, and is securely disposed in the slite **63** so as to project lower edge portion from the lower surface of the cutting plate **62** so that projecting ranges of both the blades **60**, **61** become substantially the same in the same manner described with respect to the third embodiment shown in FIG. **5**.

A resilient rectangular block **66** which is made of resilient materials such as polyvinyl chloride or sponge-like materials, is disposed inside of the rectangular punching blade **60**, and is secured in and to the larger rectangular recess **64** by screws **68** in order to force a punched-out portion **12A** of the photographic paper **12** from the punching blade **60**. The rectangular block **66** has a rectangular through hole **66B** in which the upper roller **96** is positioned to slightly extend from a lower surface of the rectangular block **66** so as to contact with a punched-out portion **12A** of the photographic paper **12** on an upper surface of the seat plate **34**.

The operation of the fifth embodiment will now be described below.

An image is printed in the preceding process (not shown), and a developed photographic paper **12** is supplied to the gap between the fixed block **26** and the moving block **28** after passing through the gap between a roller and a pressing belt.

Then, when a motor rotates, the connecting rods operate to downwardly move the moving block **28** by the rotation of an eccentric cam, thereby pressing the punching blade **60** and the cutting blade **61** against the seat plate **34**. The photographic paper **12** is thereby separated into a punched-out portion **12A** by the punching blade **60** and a punched-remaining portion **12B** which is cutted by the cutting blade **61**.

After punching, the moving block **28** is lifted, and a tensile force caused by the upper and lower transporting rollers **100** and **102** acts on the punched-remaining portion **12B** so that this portion is transported toward the separation guide **104**. On the other hand, the punched-out portion **12A** is supplied with a driving force from the lower roller **50** and the upper roller **96** which is secured to the fixed plate **99**, and is transported together with the punched-remaining portion **12B** through it has been separated therefrom.

When the photographic paper reaches the separation guide **104**, the punched-remaining portion **12B** is guided by the separation guide **104** and is moved upward. On the other hand, the punched-out portion **12A** moves straight in the same direction and is stacked. Thus, the punched-out portion **12A** and the punched-remaining portion **12B** are separated suitably, the punched-out portion **12A** is utilized as a product, and the punched-remaining portion **12B** is discharged as waste without any necessity for winding around a roller or the like.

Even if the punched-out portion **12A** has not been adequately punched out of the punched-remaining portion **12B** and if the punched-out portion **12A** is partly connected to the punched-remaining portion **12B**, it is possible to completely separate the punched-out portion **12A** from the punched-remaining portion **12B** by the upper and lower rollers.

Although particular embodiments of the present invention have been illustrated and described, it will be apparant to those skilled in the art that various changes and modification can be made without departing from the spirit of the present invention. It is therefore intended to cover in appended claims all such changes and modifications that full within the scope of the present invention.

What is claimed is:

1. A sheet punching cutter, operative at a punching position, for punching a sheet of photosensitive material having a continuous length and a predetermined width comprising:

transporting means for moving said sheet in a feed direction to the punching position at which said sheet is punched and moving said sheet away from said punching position further in said feed direction;

a fixed block at said punching position;

a moving punching blade having an aperture defined therein and being moveable towards and away from said fixed block;

a moving cutting blade means oriented transverse to said feed direction and having a width of at least said predetermined width; and

a transporting roller disposed to fit inside said aperture of said moving punching blade and adapted for transporting a punched-out portion of said sheet punched by said moving punching blade in an output direction; and

transporting speed control means for controlling the speed of said transporting roller and said transporting means such that said sheet is transported by said transporting means at a first speed and said punched out portion of said sheet is transported by said transporting roller at a second speed.

2. A sheet punching cutter according to claim **1**, further comprising separating means for guiding said punched-out portion in said output direction and a punched-remaining portion of said sheet further in said feed direction.

3. A sheen punching cutter according to claim **2**, wherein said transporting means is operative for moving said sheet to the punching position at which said sheet is punched to form said punched-out portion and a punched-remaining sheet portion and moving said punched-remaining sheet portion away from said punched position, wherein the speed at which said punched-out portion is transported by said transporting roller and the speed at which said sheet is transported by said transporting means are different from each other.

4. A sheet punching cutter according to claim **1**, further comprising a machine base, wherein said fixed block is fixed to said machine base; said punching blade is supported on said machine base so that said punching blade is provided close to and moved away from said fixed block; and said transporting roller is supported on said machine base through a supporting member.

5. A sheet punching cutter according to claim **4**, wherein urging means are disposed as between said machine base and said transporting roller, said urging means being urged in the direction toward said sheet.

6. A sheet punching cutter according to claim **1**, further comprising a moving block on which said moving punching blade and said moving cutting blade means are supported, wherein an operation of moving both said moving punching blade and said moving cutting blade means one of close to and away from said fixed block is performed by moving said moving block one of close to and away form said fixed block.

7. A sheet punching cutter according to claim **6**, further comprising separating means for guiding said punched-out portion and said punched-remaining portion of said sheet in different directions.

8. A sheet punching cutter according to claim **6**, wherein said moving punching blade is formed by a thin strip member which is bent so as to have a shape that is generally rectangular.

9. A sheet punching cutter according to claim **6**, wherein said moving cutting blade means is formed by a straight plate and is disposed in a slit provided to said moving block.

10. A sheet punching cutter, operative at a punching position, for punching a sheet of photosensitive material having a continuous length and a predetermined width comprising:

transporting means for moving said sheet in a feed direction to the punching position at which said sheet is punched and moving said sheet away from said punching position further in said feed direction;

a fixed block at said punching position;

a moving punching blade having an aperture defined therein and being moveable towards and away from said fixed block;

a moving cutting blade means oriented transverse to said feed direction and having a width of at least said predetermined width;

a transporting roller disposed to fit inside said aperture of said moving punching blade and adapted for

transporting a punched-out portion of said sheet punched by said moving punching blade;

means for supporting said sheet for punching and cutting thereof, said means including said fixed block;

punching and cutting means for punching and cutting said sheet so as to form said sheet into a punched-and-cut sheet, said punching and cutting means including said moving punching blade and said moving cutting blade means;

moving means for moving said moving punching blade and said moving cutting blade means, said moving means including a pressing plate means and a cutting plate means on which said moving punching blade and said moving cutting blade means are supported; and

transporting means for transporting said punched-and-cut sheet, said transporting means including a plurality of rollers, whereby said moving punching blade punches out a portion in said sheet, thereby to form a punched-out sheet portion and a punched-remaining sheet portion, and whereby said cutting blade means cuts said punched-remaining sheet portion.

11. A sheet punching cutter according to claim **10**, further comprising a resilient block secured to said cutting plate means for separating said punched-out sheet portion and said punched-remaining sheet portion cut from said moving punching blade and said moving cutting blade means, respectively.

12. A sheet punching cutter according to claim **11**, further comprising means for driving said moving means of said punching and cutting blades.

13. A sheet punching cutter according to claim **12**, wherein said driving means is a motor, said cutting plate means has a projection through which a hole is provided, and a recess is formed around said through hole, said pressing plate means has a through hole opposite to said projection of said cutting plate means for alignment of said two plate means, and both said cutting plate means and pressing plate means are secured to each other and connected to said driving means through a connecting member.

14. A sheet punching cutter according to claim **13**, further comprising a fixed plate secured to a machine base and extending in said through hole of said cutting plate means, and said transporting means comprising first and second rollers that oppose each other, said first roller being secured to said fixed plate so as to oppose said second roller through said sheet.

15. A sheet punching cutter according to claim **11**, wherein said moving punching blade is made from an endless rectangular blade member and is secured together with said resilient block in a recess, and said moving cutting blade means is made from a straight blade member and is secured in a slit of said cutting plate means so as to project each lower edge portion of both of said moving cutting blade means and said moving punching blade from a lower surface of said pressing plate means.

16. A sheet punching cutter according to claim **10**, further comprising means for guiding said punched and cut sheet disposed downstream of said transporting means of said sheet.

17. A sheet punching cutter according to claim **10**, wherein said supporting means includes a seat plate mounted on said fixed block, and said fixed block is secured to a machine base.

18. A sheet punching cutter according to claim **17**, wherein said seat plate is made of a plurality of brass plates.

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